भारतीय मानक
Indian Standard

IS 17142 : 2019

कोयला तल मीथेन पर शब्दावली

Terminology on Coal Bed Methane

ICS 75.020

© BIS 2019

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

May 2019 **Price Group 5**

Methods and Equipments for Underground Coal Gasification and Coal Bed Methane Sectional Committee, MED 37

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Methods and Equipments for Underground Coal Gasification and Coal Bed Methane Sectional Committee had been approved by the Mechanical Engineering Division Council.

The composition of the Committee responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TERMINOLOGY ON COAL BED METHANE

1 SCOPE

1.1 Coal Bed Methane (CBM) is an unconventional form of natural gas found in coal deposits or coal seams. CBM is formed during the process of coalification (that is, transformation of plant material into coal).

1.2 Its extraction involves drilling down vertically and then horizontally in the coal seam.

1.3 The gas is released in a controlled and safe manner by pumping out the water that occurs naturally in coal seams or cleats to reduce the underground pressure on the coal.

NOTE — The referred standard is a compilation of similar definitions for terminology/ abbreviations as highlighted in **1.1, 1.2** and **1.3**, covering areas related to geology, reservoir, drilling and production processes.

2 ABANDONMENT PRESSURE

Lowest pressure at which commercial production cannot be maintained under present economic and technical conditions expressed by flowing bottom hole pressure (FBHP).

3 ADSORPTION

Enrichment of the absorptive gas at the external and accessible internal surfaces of a solid material (coal matrix).

4 ADSORPTION ISOTHERM

Relationship between the amount of gas adsorbed and equilibrium pressure of the gas at constant temperature.

5 SORPTION TIME

Time in hour or day taken for 63.2 percent of the total absorbed gas to desorb from the matrix.

6 ADSORPTION SATURATION

Ratio of measured gas content to the maximum adsorbed gas content in theory per unit mass of coal under particular CBM reservoir pressure and temperature conditions.

6.1 Air Dried Basis

Means of expressing an analytical result based on the condition in which a solid mineral fuel is in equilibrium with atmospheric humidity.

6.2 Appraisal Well

Well drilled after the gas has been discovered, in order to establish the limits of accumulation in terms of both the area extent and thickness of reservoir and the volume of hydrocarbons it contains, and to obtain fluid samples to investigate the distribution of fluid properties in the reservoir.

6.3 Artificial Fracture

Fracture created in coal seam through fracturing technology.

6.4 Ash

Residue obtained by incineration of a solid mineral fuel under specified conditions.

6.5 Azimuth

The azimuth of a directional well is the deviation from the true north measured in clockwise direction.

7 BAILING

Operation of coal fines or sand fishing from well bottom by a kind of bucket.

7.1 Bore Hole

Well drilled in the sub-surface with or without obtaining the cores of rock samples for the purpose of ascertaining any information.

7.2 Cased Hole Completion

A well completion method in which casing is run along the entire length of the CBM well, and cemented in such a way to make it effectively act as a control mechanism for safe production of desired CBM and as a barrier preventing the re-introduction of unwanted fluids, gases or solids into the well bore.

7.3 Casing Pressure

Pressure in a well that exists between the casing and tubing or the casing and drill pipe.

7.4 Casing Programme

A part of the well design which includes number of casing layers in the well, borehole diameter to be drilled for each casing, casing setting depth, diameter, grade, type, coupling, etc. of each casing string depending on the fracture pressure, pore pressure and type of formation fluids.

7.5 Cavern Completion

Well completion method to create a cave in target stratum after fall of coal seam into well bore through pressure inducing, hydraulic chambering, etc. methods.

8 COAL BED METHANE (CBM)

It means natural gas (mainly methane) contained in coal or bituminous lignite beds under reservoir condition and extracted from there during CBM operations.

8.1 CBM Content

Volume of hydrocarbon gas per unit mass of coal, usually expressed in cubic meter of gas per ton of coal under standard temperature and pressure (STP).

8.2 CBM Development

Exploitation of coal bed methane from coal seams through surface bore hole.

8.3 CBM Drainage

Technology process to eject water out from CBM production well by artificial lift method to realize CBM production.

8.4 CBM Exploration

Initial phase in coal bed methane operation that includes generation of a prospect or play or both, and drilling of an exploration well.

8.5 CBM Field

An area within the contract area consisting of a single CBM reservoir or multiple CBM reservoirs all grouped or related to the same individual geological structure or stratigraphic conditions (to include the maximum area of potential productivity in the contract area) in respect of which a potential commercial assessment has been declared, commercial assessment made and a development plan approved.

8.6 CBM Geology

8.6.1 Natural gas, predominantly methane (CH_4), generated during coal formation and adsorbed in coal. Natural gas adsorbs to the surfaces of matrix pores within the coal and natural fractures or cleats as reservoir pressure increases.

8.6.2 Production of natural gas from coal requires decreasing the pore pressure below the coal's desorption pressure so that methane will desorb from surfaces, diffuse through the coal matrix and become free gas. Because the diffusivity and permeability of the coal matrix are ultralow, coal must have an extensive cleat system to ensure adequate permeability and flow of methane to well bores at economic production rates.

8.6.3 Coal seams are typically saturated with water. Consequently, the coal must be dewatered for efficient gas production. Dewatering reduces the hydrostatic pressure and promotes gas desorption from coal. As dewatering progresses, gas production often increases at a rate governed by how quickly gas desorbs from coal, the permeability of cleat and the relative permeability of the gas-water system in the cleat. Eventually, the rate and amount of gas desorption decreases as the coal seam is depleted of its gas and production declines.

8.6.4 Coal seams with no water (dry coal) have been discovered and commercially exploited. In these reservoirs, the adsorbed gas is held in place by free gas in the cleats. Consequently, gas production consists of both free gas from the cleat system and desorbed gas from the matrix.

8.7 CBM Operations

Exploration operations, development operations or production operations or any combination of two or more such operations including, but not limited to, construction, operation and maintenance of all necessary facilities, plugging and abandonment of wells, environmental protection, transportation, storage, sale or disposition of CBM to the delivery point, site restoration and all other incidental operations or activities as may be necessary.

8.8 CBM Reservoir

Coal seams and surrounding rock with hydrocarbon resources that can potentially be extracted for commercial purposes.

8.9 CBM Resources

Naturally occurring concentrations or reservoirs of coal bed methane in coal seams and surrounding rock in such forms and amounts that economic extraction is currently or potentially feasible.

8.10 CBM Well Completion

Technology to achieve connection between drilled coal bed methane well and target stratum of development.

8.11 CBM Well Pattern

Geometric arrangement mode of coal bed methane development well.

9 CLAMP-OFF

Processing measurement to decrease coal fines or bridge over.

9.1 Cleat

The vertical cleavage of coal seams. The main set of joints along which coal breaks when mined or, an orthogonal fracture set in coal seams that is generally oriented perpendicular to bedding. One fracture direction (face cleats) is typically more continuous than the other (butt cleats).

9.2 Closure Pressure

Construction pressure to make fracture closed after pump stops in fracturing.

9.3 Cluster Wells

Group of two or more wells drilled from one drilling pad.

9.4 Coal

A chemically complex, combustible solid principally composed of consolidated and chemically altered plant remains or, a readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50 percent by weight and more than 70 percent by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time.

9.5 Coal Bed (or Coal Seam)

A distinct, laterally continuous body of coal that may consist of many litho types, is bounded above and below by inorganic facies, and often grades literally into carbonaceous shale.

9.6 Coal Bed Gas

Gas formed during the coalification process, adsorbed to the coal surface, and liberated by a decrease in reservoir pressure. The most abundant gas is methane but carbon dioxide, nitrogen and ethane are common.

9.7 Coal Fines

Initial or secondary created solid particles of coal rock entering from coal seams to the well bore with water or gas during coal bed methane production process.

9.8 Coal Bed Following Drilling

Drilling type following coal seams with dip more than 45°.

9.8.1 *Coal Rank*

Position of a coal in the coalification series from lignite coal (low rank) to anthracite (high rank), indicating maturity in terms of chemical and physical properties.

9.8.2 *Coal Seam Gas (CSG)*

Methane found in coal seams. It is formed during the coalification, the process that transforms plant material into coal. Also known as coal seam methane or coal bed methane.

9.9 Coalification

The process by which organic material is transformed chemically into coal through increasing heat and pressure with burial.

9.10 Commercial Assessment

An assessment made by the Contractor for the purpose of determining whether or not CBM accumulations in the contract area are commercially exploitable and whether or not commercial production is viable after consideration of all pertinent technical, financial and economic data and other relevant factors according to generally accepted modern CBM/oilfield and petroleum industry practices.

9.11 Commercial Production

Production of CBM from the contract area and delivery of the same at the relevant delivery point(s) under a programme of regular production and sale.

10 CORE

Cylinder coal rock sample obtained in the well by coring operation.

10.1 Core Cutting

Operation to cut a cylindrical sample of core (coal) from a designated depth interval during the process of drilling.

10.2 Core Hole

Borehole in which coring is carried out up to the final depth of the bore hole for the purpose of detailed study of various parameters of rock and also coal or lignite samples.

10.3 Critical Desorption Pressure

Pressure in which the gas begins to desorb from the coal matrix as the CBM reservoir pressure declines.

10.4 Delivery Point

The point at which CBM reaches the outlet flange of the delivery facility and different delivery points may be established for the purpose of sale.

10.5 Desorption

The process by which a coal sample that is retrieved from the sub-surface is degassed by subjecting it to low pressure for several weeks and capturing the liberated gas.

10.6 Diffusion Coefficient

Rate of gas diffusion through a material expressed in m^2/s. Express flow ability of coal bed methane depending on concentration.

10.7 Directional Well

Well drilled at a predetermined angle and direction from a surface location to reach a target which is not located directly underneath the well head.

10.8 Dry Ash-free Basis

An analytical result based on a hypothetical condition in which the solid mineral fuel is considered to be free from both moisture and ash.

10.9 Development Well

Well drilled, deepened or completed after the date of approval of the development plan pursuant to development operations or production operations for the purpose of producing CBM, increasing production, sustaining production or accelerating extraction of CBM including production wells, de-watering wells, injection wells and dry wells. It will also include exploration wells and pilot assessment wells converted as development wells.

11 DIRT BAND PARTING

Layer of mineral matter lying parallel to the bedding plane in a seam of coal.

11.1 Dog-leg Severity

Dog-leg severity is a measure of the rate of change of direction of the well path, usually expressed in two-dimensional degrees per 30 m.

12 DUAL POROSITY SYSTEM

Rock characterized by primary porosity from original deposition and secondary porosity from some other mechanism viz. either cleat or fracture and in which all flow to the well effectively occurs in one porosity system, and most of the fluid is stored in the other.

13 ELECTRIC SUBMERSIBLE PUMP (ESP)

Electric motor driven and rodless pump sunk in liquid inside the well, such as centrifugal pump, screw pump, diaphragm pump, etc.

13.1 Environmental Damage

Soil erosion, removal of vegetation, destruction of wild life, pollution of ground water or surface water, land contamination, air pollution, noise pollution, bush fire, disruption to water supplies, natural drainage or natural flow of rivers or streams, damage to archaeological, paleontological and cultural sites and shall include any damage or injury to, or destruction of, soil or water in their physical aspects together with vegetation associated therewith, aquatic or terrestrial mammals, fish, avi-fauna or any plant or animal life.

13.2 Exploration Operations

Operations conducted in the contract area pursuant to this contract in searching for commercial CBM accumulation and shall include, but not limited to aerial, geological, geophysical, geochemical, paleontological, palynological, topographical and seismic surveys, analyses, studies and their interpretation, investigations relating to the sub-surface geology including structure test drilling, stratigraphic test drilling, drilling of pilot Wells for the purpose of assessment of CBM potential, carrying out other related activities such as surveying, drill-site preparation and all work necessarily connected with and conducted in connection with CBM exploration (including preparation of techno-economic pre-feasibility studies, market surveys and commitments, and full scale commercial development plan).

13.3 Exploration Well

A well drilled for the purpose of searching for potential assessment of CBM accumulation on any geological entity, be it of structural, stratigraphic or pressure nature.

13.3.1 *Field*

Coal bed methane field in respect of which a development plan has been duly approved.

13.3.2 *Flare*

Gas disposed off by burning in flares usually at the production sites or gas processing plants.

13.4 Flowing Bottom Hole Pressure (FBHP)

Fluid pressure at a certain depth of a deposit during process of production.

13.5 Flowing Fluid Level (FFL)

Distance from fluid level in annular space of casing pipe to wellhead during production(unit is metre).

13.6 Fracture

Natural fracture in a formation resulting from external stress, usually being associated with a displacement.

13.7 Fracture Conductivity

Ability to allow fluid to flow through fracture. Equal to product of fracture permeability and fracture width.

13.8 Fracture Half-length (Radius of Fracture)

Distance of extending of fracture through radial direction from well bore to coal reservoir after fracturing coal reservoirs. It is normally equal to length of horizontal fracture.

13.9 Fracture Pressure

It is the pressure in the well bore at which a formation will crack or, the critical pressure for formation breakdown in open hole.

13.10 Fracture Pressure Gradient

Pressure gradient at which a specific formation interval breaks to form fractures.

13.11 Fracture Extension Pressure

Pressure in fracture making, fracture opening and extending in fracturing.

14 GAS CONTENT

Volume of gas per unit mass of coal, usually expressed in cubic meter of gas per ton of coal under standard temperature and pressure (STP) conditions. Unit is m^3/t or cm^3/g. Standard temperature and pressure conditions are 10 0000 Pa and 0°C (273.15 K).

14.1 Gas Locking

Phenomenon of preventing liquid from going in or out of pump when much gas enter pump during working of deep-well pump.

14.2 Gas Anchor

Tools to separate gas and liquid on the underground tubing string, and reduce gas going to the pipeline.

14.3 Gas-water Separator

Equipment to separate water from produced gas.

14.4 Geologic Carbon Sequestration (CO_2)

It is a method of securing carbon dioxide in deep geologic formations to prevent its release to the atmosphere and contribution to global change as a greenhouse gas.

15 JET PUMP

Pump in which a jet of fluid in rapid motion lifts a large quantity of another fluid by its impulse.

15.1 Horizontal Displacement

Horizontal distance from measured point on well track to well bore.

15.2 Horizontal Fracture

Fracture surface is parallel to the coal seam, normally caused when horizontal crustal stress is larger than vertical crustal stress.

15.3 Horizontal Well

Well whose hole deviation angle is near, equal or larger than 90° with bore hole entering target seam and extending to a length or, a well in which well bore is initially drilled on a vertical or directional plane and finally curved to become horizontal or near horizontal, in order to parallel a particular geological formation, which may include multiple horizontal or stacked laterals.

15.4 Horizontally Staged Fracturing

Technology to operate multi-stage fracturing to horizontal wells through separate layer (segment) fracturing technology.

15.5 Hydraulic Fracturing

Well stimulation method where a fracturing fluid is pumped into the coal seam at high pressure and flow rate resulting in fractures in the coal seam or, also referred to as hydro-fracking, hydro-fracturing and fracking. It is a well development process that involves injecting water under high pressure into a bedrock formation via the well. This is intended to increase the size and extent of existing bedrock fractures.

15.6 Inclination (Deviation) Angle

It is the deviation (measured in degree) from vertical direction of the well.

15.7 Initial Reservoir Pressure (P_i)

Initial gas pressure measured in a reservoir prior to the start of production.

15.8 Injection Fall-off Test

Method of determination of reservoir permeability based on measurement and analysis of pressure data gathered from a well under injection at a constant rate followed by shut-in.

15.9 Inter-well Interference

A point in common drainage area in the same coal seam where sum of pressure drop results in acceleration of gas desorption.

16 LANGMUIR VOLUME (V_L)

Maximum adsorbed gas content per unit mass of coal at infinite pressure under particular temperature conditions.

16.1 Langmuir Pressure (P_L)

Pressure at which half of the Langmuir volume exists within the coal under particular temperature conditions.

16.2 Lease

A petroleum mining lease granted for the purpose of exploitation of CBM issued under the rules.

16.3 Lessee

The contractor to whom a lease is issued under the rules for the purpose of carrying out CBM operations in the contract area.

16.4 Liquid Column Height

Distance from fluid level in annular space of casing pipe to the middle of reservoir during production (unit is metre).

16.5 Liquid Producing Rate

Liquid volume ejected out of well in unit time. The unit is m^3/d.

16.6 Log

Systematic recording of data, such as a driller's log, mud log, electrical well log or radioactivity log. Many different logs are run in wells to discern various characteristics of down-hole formation.

17 MEASURED DEPTH (MD)

Measured length of bore hole axis from rig rotary table surface to measure point in the well.

17.1 Methane

A colourless, odourless, inflammable gaseous hydrocarbon, the simplest of alkane series and the main constituent of natural gas or, a colourless, odourless gas, the simplest paraffin hydrocarbon, (CH_4). It is the principal constituent of natural gas and is also found associated with crude oil. Methane is a greenhouse gas in the atmosphere because it absorbs long wavelength radiation from the earth's surface.

17.2 Methane Emission

The volume of liberated methane released to the atmosphere. Methane used is not considered methane emitted. Methane emissions are calculated by subtracting the amount of methane used from the amount of methane liberated.

17.3 Multi-lateral Horizontal Well

Horizontal well with more horizontal well segments or with more branch horizontal well segments drilled in one horizontal well segment.

18 NATURAL GAS

Gas obtained from wells and consisting primarily of hydrocarbons and includes CBM but does not include helium occurring in association with such hydrocarbons.

19 OPEN HOLE COMPLETION

Well completion method when casing pipe lowered and cemented up to the top of coal bed methane producing layer.

20 ORIGINAL CBM IN PLACE

Volume of coal bed methane in a reservoir prior to production.

21 PERMEABILITY

A measure of the ability of a rock to permit fluids to be transmitted through it. It is controlled by pore size, pore throat geometry and pore connectivity. Permeability is typically reported in Darcy.

22 PILOT ASSESSMENT WELL

A well drilled for the purpose of determining the potential CBM accumulation in the contract area on geological entities in terms of thickness, lateral extent and gas content of coal seams upto a depth or stratigraphic level specified in the work programme.

23 PRESSURE GRADIENT

Pressure change with distance or, ratio of fluid pressure in the middle of the coal seam and reservoir depth or, rate of pressure change with respect to depth of coal bed methane reservoir in unit depth (MPa/m).

24 PRODUCTION CURVE

Group of characteristic curves which describe production well drainage status including transformation curves indicate gas production *versus* time, water production *versus* time, fluid level *versus* time, casing pressure and flowing bottom hole pressure *versus* time, etc.

24.1 Production System

Combination of pump diameter, stroke, jig frequency, rotate speed, etc, parameters during coal bed methane production depending on production design.

24.2 Production Operations

All operations conducted for the purpose of producing CBM from contract area after the commencement of production from the contract area including, but not limited to, operation and maintenance of all necessary facilities.

25 PROPPANT

Solid particles filling and support fracture in fracturing technology.

25.1 Proppant Volume Percentage

Ratio of volume of proppant added accumulated volume of proppant to volume of used liquid when pumping proppant-carrying fluid.

25.2 Prospecting Well or Wildcat Well

Well drilled for the purpose of discovering a new field or reservoir in the new frontier.

26 PUMP INSPECTION

Generic terms of maintenance, operation to replace, deepen or lift setting depth of pump, change pump diameter, relieve coal fine block of pump, sand block, sucker rod broken, parts depreciation, etc.

26.1 Pump Setting Depth

Entering depth of standing valve of pump (unit is metre).

26.2 Re-fracturing

Fracture more than once on the same layer of the same well.

26.3 Submergence

Depth of pump sunk in the liquid to working fluid level when deep-well pump works (unit is metre).

26.4 Vertical Fracture

Fracture surface is perpendicular to the coal seam, normally caused when horizontal stress is smaller than vertical stress.

26.5 Vertically Staged Fracturing

Pointed fracture layer by layer (segment) after separating target layers (segment) through a method.

26.6 Vitrinite

One of the primary components of coal and most sedimentary kerogen. Vitrinite is a type of maceral, where ’macerals’ are organic components of coal analogous to the ’minerals’ of rocks. It is derived from the cell-wall material or woody tissue of plants.

26.7 Wireline Coring

Operation to obtain rock sample core drilled from stratum by wire line core barrel.

26.8 Proximate Analysis

Analysis of a solid mineral fuel reported in terms of moisture, volatile matter, ash and fixed carbon.

27 RECOVERY FACTOR

Ratio of recoverable amount of hydrocarbon and initially in place amount of methane.

27.1 Reserve

Portion of the demonstrated reserve base that is estimated to be recoverable at the time of determination. Derived by applying a recovery factor to that component of the identified resource designated as the demonstrated reserve base.

27.2 Reservoir

A naturally occurring accumulation of coal or lignite of any rank and/or quality which contains CBM.

27.3 Rod Pump

Kind of oil pump whose external working barrel connect to the bottom of tubing string, pump barrel and plunger connect to the bottom of rod, enter into well together, and insert the external working barrel.

27.4 Royalty

A statutory payment payable to the state government(s).

27.5 Screen Pipe Completion

Well completion method of using screen liner in target zone.

27.6 Seismic

Exploration technique that can find structures and potential reservoir traps by reflecting sound waves from the rock strata.

27.7 Site Restoration

All activities required to return a site to its natural state or to render a site compatible with its intended after-use (to the extent reasonable) after cessation of CBM operations in relation thereto and shall include, where appropriate, proper abandonment of wells or other facilities, removal of equipment, structures and debris, establishment of compatible contours and drainage, replacement of top soil, vegetation, slope stabilisation, infilling of excavations or any other appropriate actions in the circumstances as per modern CBM/oilfields and petroleum industry practices.

27.8 Shrinkage Contraction Co-efficient

Decrease in volume of coal matrix after gas desorption expressed as a percentage of the initial volume.

27.9 Skin Effect

Change in permeability near well bore causing additional flow effect (pressure drawdown) caused due to drilling, well completion, work-over job or well stimulation.

27.10 Static Fluid Level

Distance from stable fluid level in annular space of casing pipe to well head when stop production is stopped(unit is metre).

27.11 Stimulation

Technology to improve initial fracture system of coal seam and to improve connection between coal seam fracture and well bore or other technology to improve production ability.

27.12 Test Well

An exploration well drilled for the purpose of carrying out different well tests to assess the CBM production potential of the coal or lignite seams. The well tests in such a well shall include but not limited to injection or fall-off tests, stress test, dewatering test for production testing or any other test as required for estimation of CBM and water production rates.

27.13 True Vertical Depth (TVD)

Vertical distance from measured point to Kelly bushing surface.

27.14 Tubing Pump

Kind of oil pump whose pump barrel connect to the bottom of tubing string, enter into well with pipeline.

27.15 U-type Well

Combination of a horizontal well and a vertical well with far end of the former connecting to the latter.

27.16 V-type Well

Combination of horizontal well(s) with far ends connecting to the same vertical well.

28 VENTILATION AIR METHANE (VAM)

28.1 Methane mixed with the ventilation air in the mine that is circulated in sufficient quantity to dilute methane to low concentrations for safety reasonsor, methane contained in the exhaust air of the ventilation system of a mine, which originated across the mine working and diluted to low concentrations by the circulation of outside air.

28.2 Virgin CBM

Methane produced from unmined or virgin coal seams using surface bore holes.

28.3 Volatile Matter

Loss in mass, corrected for moisture, when a solid mineral fuel is heated out of contact with air under specified conditions.

29 WELL

A bore hole or core hole made by drilling in the course of CBM operations, but does not include a seismic shot hole.

29.1 Well Cementing

Operation to inject cement into annular space between casing string and bore hole wall.

29.2 Well Work-over

Repair operation of production well which require pulling out/in tubing string.

29.3 Zone Evaluation

Screening of various zones to decide on one or more favourable zone through comprehensive geological research.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Methods and Equipments for Underground Coal Gasification and Coal Bed Methane Sectional Committee, MED 37

Organization	*Representative(s)*
Oil and Natural Gas	Shri Rajeev Kumar Singhal (***Chairman***) Shri O. N. Gyani (*Alternate* I) Shri A. K. Paswan (*Alternate* II) Ms Vishakha Singh (*Alternate* III) Shri Khalequz Zaman (*Alternate* IV) Shri Shakeel Ahmed (*Alternate* V) Shri S. Marandi (*Alternate* VI)
Atlas Copco Construction & Mining Sales, Pune (Atlas-Copco), Dapodi	Shri Animesh Nandy
Bhel, Hyderabad	Shri D. Satya Mohan Rao
Central Fuel Reasearch Institute (CFRI), Dhanbad	Dr Ashok Kumar Singh
Central Mechanical Engineering Research Institute (CMERI), Dhanbad	Dr P. K. Chaterjee Dr M. K. Karmakar (*Alternate*)
Central Mine Planning And Design Institute Limited (CMPDI), Ranchi	Dr Akhilesh Singh
Directorate General of Hydrocarbons (DGH), Noida	Shri Sanjeeb Goswami Shri T. Ashwini Kumar (*Alternate*)
Essar Oil Limited , Mumbai	Shri Nilesh Kamat Shri Arun Sharma (*Alternate*)
Gail India Limited, New Delhi	Shri D. M. Rao Dr D. Buragohain (*Alternate*)
Great Eastern Energy Corporation Limited (GEECL), Gurugram	Shri Anoop Gupta Shri Priyaranjan Patra (*Alternate*)
Ism, Dhanbad (IIT-ISM)	Prof M. Jawed Shri A. K. Verma (*Alternate*)
Neyveli Lignite Coporation (NLC) , Neyveli	Shri K. Alagar Shri M. Krishnan (*Alternate*)
IIT, Madras	Prof Srinivas Jayanti Prof Preeti Aghalayam (*Alternate*)
In Personal Capacity	Shri Rakesh Kumar
In Personal Capacity	Shri Rudra Pratap Singh
Director General, Bis	Shri Rajneesh Khosla, Scientist 'E' & Head (MED) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri Sandeep Keshav
Scientist 'B' (MED), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: MED 37 (13292).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002
{ 2323 7617
{ 2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi
KOLKATA 700054
{ 2337 8499, 2337 8561
{ 2337 8626, 2337 9120

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg
CHANDIGARH 160019
{ 265 0206
{ 265 0290

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113
{ 2254 1216, 2254 1442
{ 2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093
{ 2832 9295, 2832 7858
{ 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi